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MONTHLY ICE CHARTS.

ARCTIC SEAS.

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JUL 31 1961

Hudson Bay to Kara Sea.

Prepared in the Marine Branch, Meteorological Office, Air Ministry, London,

in co-operation with the Naval Meteorological Branch, Admiralty.

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RAM 551.326.12 :(*60)

MONTHLY ICE CHARTS, ARCTIC SEAS.

HUDSON BAY TO KARA SEA.

Descriptive Terms and Reporting of Ice.

The ice limits shown on the charts in this Atlas are obtained from all available sources, based on information received since 1920.

The edge of the light colouring shows the probable mean position of the ice edge for the middle of the month, while the pecked line shows the probable extreme limit outside of which ice is unlikely to be encountered even in a bad year.

It should be borne in mind that an offshore wind will cause the ice to drift further out while an inshore wind will press the ice closer to the coast, making it more compact. Persistent strong winds away from or towards the ice edge will cause it to advance or recede temporarily up to 50 miles near Björnöya (Bear island) and Spitsbergen and even more elsewhere, in about three days.

The following descriptive terms and style of report should be used when reporting ice :—

CODE FIGURE.	DESCRIPTIVE TERMS.
(1)	HEAVY POLAR ICE. Mainly floes of great thickness and extent, perhaps heavily hummocked but frequently reduced to a more or less even surface—extremely heavy pack-ice through which the most powerful ice-breakers cannot penetrate unless large leads (or lanes) of open water occur between the floes.
(2)	PACK ICE (other than (1)). Smaller and lighter floes than the above, almost always of varying sizes ; the surface may be either hummocked or level. This type of ice can be penetrated by icebreakers, and small wooden vessels can also work their way through as opportunity offers. If the amount of sea covered is less than 6/10, navigation by normally built ocean-going merchant ships is possible, but there is always a chance that a wind will close the floes together and cause the ship to be, at any rate temporarily, beset. Pack-ice is said to be " open " when the floes, though near each other, do not generally touch ; and " close " when they are for the most part in contact and navigation becomes difficult except for suitable vessels.
(3)	BRASH-ICE. Small pieces of ice less than 6 feet across, both new and decaying ; and all other ice in a waterlogged state and appearing of darker tone.
(4)	FAST-ICE. Ice along and fixed to the shore. The distance to which it extends offshore should be noted.
(5)	ICEBERGS. Irregularly shaped blocks of ice protruding 15 feet or more above the surface of the sea. These should be reported both if associated with any of the above types or if occurring as isolated bergs in the open sea.
(6)	PACK- and BRASH-ICE.
(7)	PACK-ICE with occasional ICEBERGS.
(8)	PACK-ICE and FAST-ICE.

STYLE OF REPORT.

The report should consist of a four-figure group, wherein

(i) The first figure indicates the amount of the sea covered with ice expressed in tenths.

(ii) The second figure is the " descriptive term " as given above ;

(iii) The third figure indicates the size of the floes according to the following table :

CODE FIGURE.	MEANING.
1	Less than 6 feet—brash ice.
2	6-60 feet—small floes.
3	60-600 feet—medium floes.
4	600 feet to 1 mile—large floes.
5	Any floes larger than 1 mile—very large floes.

(iv) The fourth figure gives an indication as to what extent the ice appears to be navigable according to the following code :

CODE FIGURE.	MEANING.
1	Clear leads or lanes or sufficient open water to enable vessels up to and including destroyers (under 350 feet) to navigate in good visibility with little risk of hitting ice floes.
2	Large stretches of open water (not less than 500 yards in width) within a radius of about 5 miles.
3	Insufficient open water to enable even small ships to avoid all floes.
4	Ice more or less evenly distributed. Few if any stretches of open water (not less than 500 yards in width) within sight.
5	No estimate made of navigational possibilities.

Example :—

(*a*) A report 6233 indicates that 6/10 of the sea is covered with pack-ice, consisting of floes between 60 and 600 ft. in size ; there is insufficient open water to enable even small ships to avoid all floes.

(*b*) A report 4322 indicates that 4/10 of the sea is covered with brash-ice (ice in a waterlogged state, etc.), consisting of floes between 6 and 60 ft. in size ; there are large stretches of open water (not less than 500 yards in width), within a radius of about 5 miles.

(*c*) A report 0502 indicates that one or more icebergs are in sight (the proportion in tenths of sea covered being negligible) and there are large stretches of open water within a radius of about 5 miles.

NOTES :— (i) If the ice consists partly of pack and partly of brash-ice, the size of floes should apply to the pack-ice unless the large majority of the ice is brash.

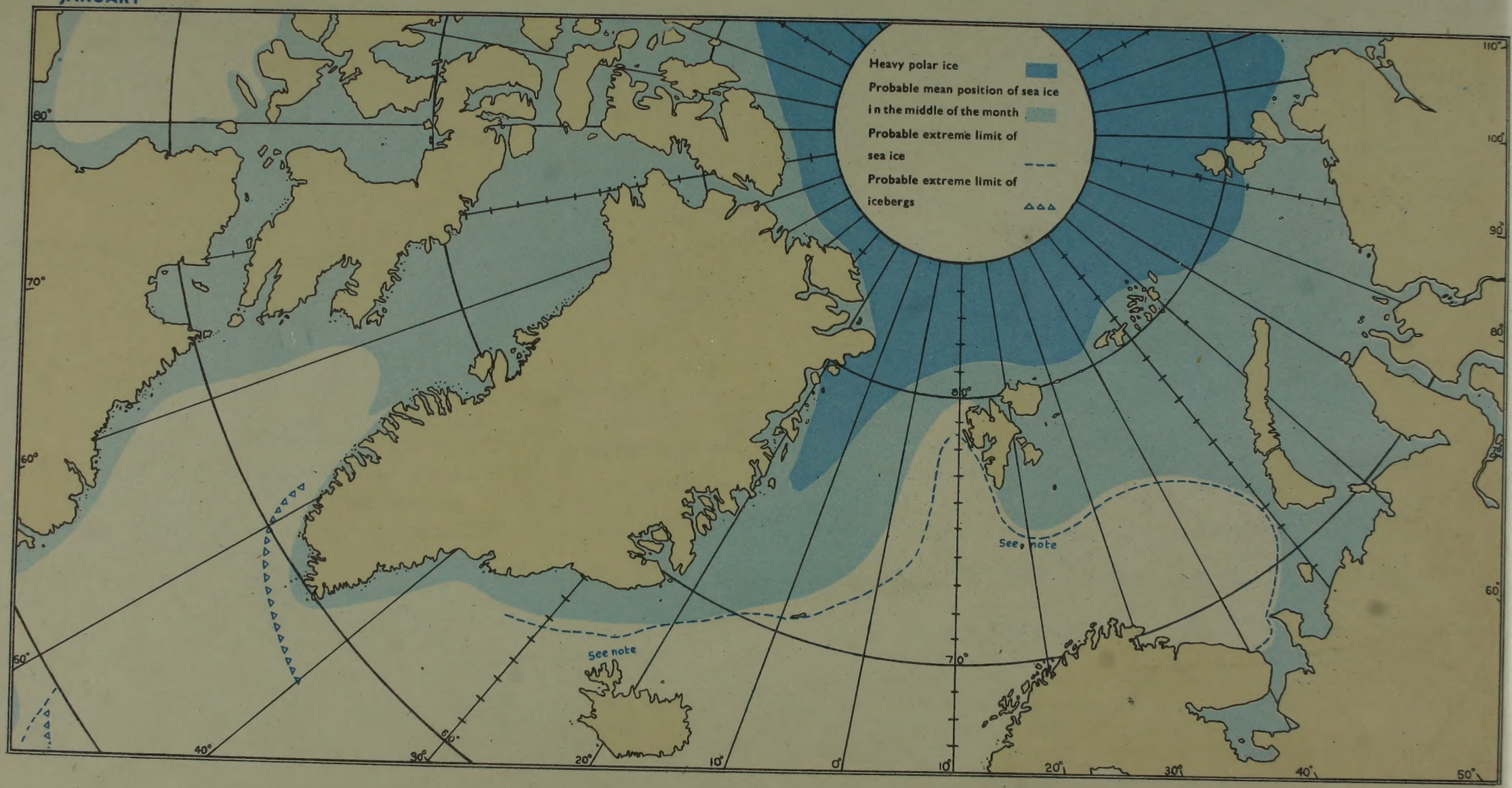
(ii) The ice edge may be a regular line with considerable tightening of the floes along the edge, or it may consist of a succession of ice streams or patches, or it may be frayed out into a number of points with perhaps off-lying isolated fragments. Any peculiarities of the edge should be reported.

(iii) If a harbour or port is frozen, the report should state when possible, whether movement of shipping is completely prohibited or might be possible with the help of an icebreaker.

(iv) A weather report should invariably accompany an ice report, H.M. SHIPS reporting in accordance with Article 94 in A.F.O. S.2.

INDEX CHART OF PLACE NAMES MENTIONED IN THE NOTES.

JANUARY


Heavy polar ice
Probable mean position of sea ice in the middle of the month
Probable extreme limit of sea ice
Probable extreme limit of icebergs
See note
See note
80°
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AVERAGE ICE CONDITIONS DURING JANUARY

REGION WEST OF GREENLAND

The whole of Baffin bay and Hudson strait is choked with ice. Pack-ice drifting out of Hudson strait joins with the Baffin bay pack off Cape Chidley, and passing down the Labrador coast blocks the Strait of Belle Isle and reaches the Great bank of Newfoundland, where it generally arrives during this month.

A tongue of the Baffin bay middle pack, known as " west-ice," extends southwards off the west Greenland coast about 15 miles out to sea. The extreme southern limit of this west-ice reached Frederikshaab in 1934. There may be open water, as far as Disko bay, between the west-ice and the winter fast-ice, which now fills all the fiords on the west coast of Greenland.

Pack-ice rounding Cape Farewell from the east coast, locally known as " storis," attained its most northerly limit in 1924 and 1933, when it reached Frederikshaab. This belt of pack-ice is usually very narrow, but in 1930, scattered ice caused by the prevailing northerly winds was seen 80 miles south of Cape Farewell, which is exceptional.

EAST COAST OF GREENLAND

The belt of pack-ice is, on the whole, wider than in December, but the channel between the edge of the pack-ice and north-west Iceland is over 70 miles wide. The extreme limit shown off Iceland does not reach the 100-fathom line. Exceptional instances of ice sighted off Iceland occurred in 1923, when pack-ice was observed off the western fiords, and in 1936 when ice was seen 30 miles N. by W. of Horn (North cape).

The extreme limit shown in the Greenland sea is that for 1942.

BARENTS SEA

The north-west and west coasts of Spitsbergen are ice-free, but fiords on these coasts may be frozen over.

The cold current in the Barents sea flowing in a south-westerly direction towards Björnöya (Bear island) has an appreciable effect, extending the ice limit southwards between the 20th and 30th meridians. The extreme limit shown is that for 1942 ; in several previous years ice reached Bear island, but was not such as to hinder navigation.

The north Barents sea becomes unnavigable in January, owing to the presence of ice which extends down the west coast of Novaya Zemlya, blocking Matochkin strait. Ice extends from Gusinaya Zemlya (Goose land) across the Pechora sea to Kolguev island and Cape Kanin.

WHITE SEA

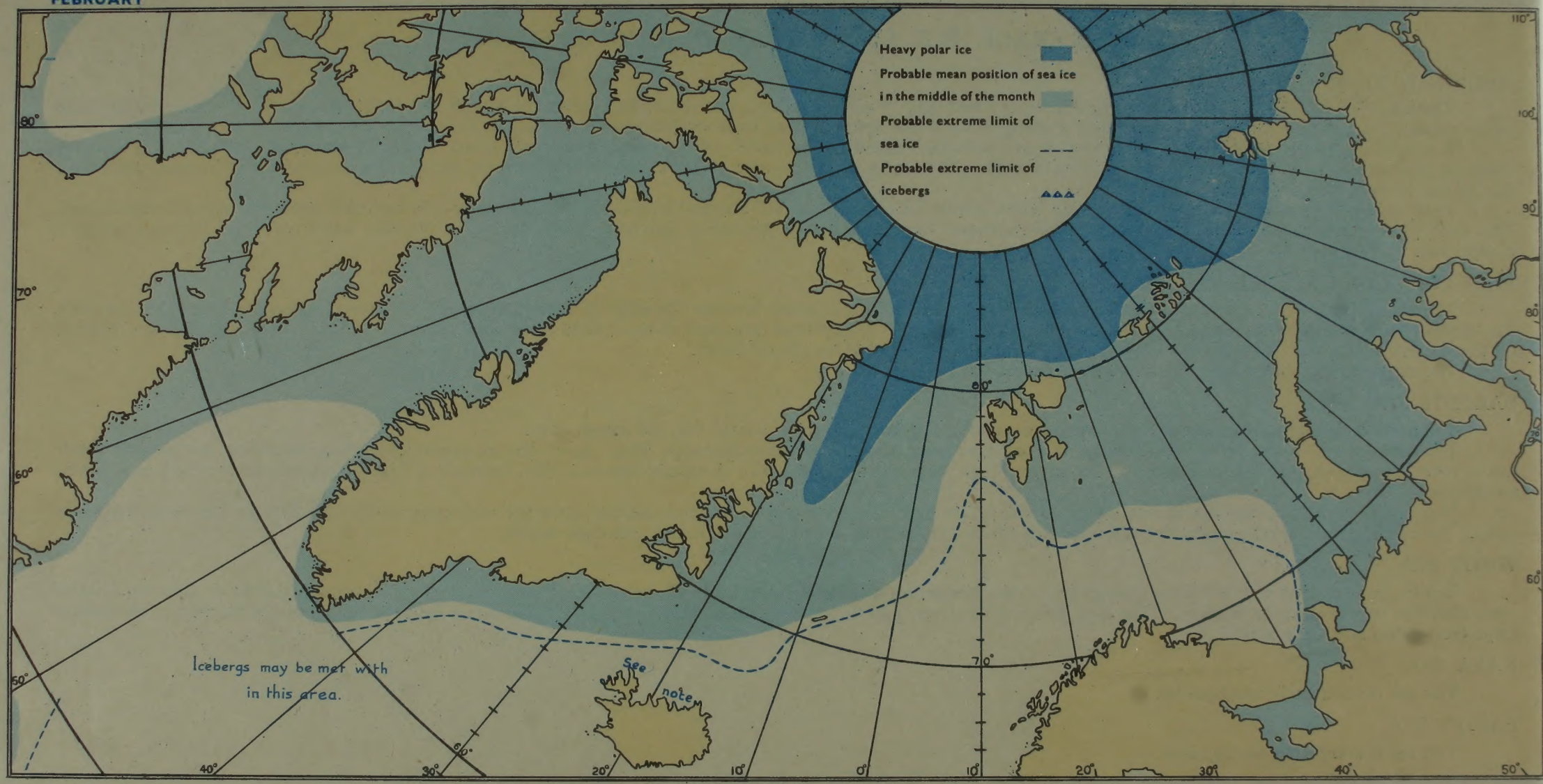
The Gorlo is choked with ice dense enough to prevent navigation without the assistance of icebreakers ; even so it is usually impracticable to keep the channel open after the second week in January. The long hours of darkness add to the difficulties of ice navigation. Young ice forms at the mouth of the White Sea between Cape Gorodetski and Cape Kanin.

KARA SEA

This sea is completely unnavigable.

LAPTEV SEA

This sea is completely unnavigable.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Probable mean position of sea ice in the middle of the month
Probable extreme limit of sea ice
Probable extreme limit of icebergs
Icebergs may be met with in this area.
See note
80°
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10°
20°
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40°
50°
60°
70°
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AVERAGE ICE CONDITIONS DURING FEBRUARY

REGION WEST OF GREENLAND

Ice along the shores of Hudson bay in general increases, but does not form out in the bay itself. Hudson strait is completely blocked by pack-ice, with bergs amongst the floes. This is the worst month of the year, with only about 15% open water. There is an increase in the pack-ice passing down the Labrador coast to the Strait of Belle Isle and northern Newfoundland. This pack-ice is composed of locally formed Baffin bay ice, heavy polar ice from Smith sound, and ice from Hudson strait in the proportion 60%, 30%, 10%. Icebergs may be observed drifting down the east side of the Great bank of Newfoundland. Cumberland sound freezes over entirely, although the tides may break up the ice and cause lanes.

The fiords on the west coast of Greenland south of Disko bay are now filled with fast-ice which often extends far out from the coast. Pack-ice in Davis strait has also greatly increased and may extend as far south as Sukkertoppen, where it joins the fast-ice extending seaward from the coast. Pack-ice (storis) rounding Cape Farewell may reach as far north as Fiskernaes, as was the case in 1924. Julianehaab bay is usually filled with ice in this month. Off Cape Farewell the wind may cause scattered ice floes to extend beyond the mean limit, but this does not generally impede navigation. Scattered bergs may also be found far to the southward of the limit of ice shown on this chart.

EAST COAST OF GREENLAND

The width of the ice-free channel in Denmark strait is usually 60-70 miles. The extreme limit off the east coast of Greenland occurred in 1942, except to the north of Iceland, where the 1943 limit is shown. Ice appeared off the north-west coast of Iceland in 1933 and 1934, and off Horn (North cape) in 1924, 1932 and 1938 (when it was within 2-8 miles). This ice, probably brought there by north-westerly winds, appeared only for a few days and did not hinder navigation for any considerable period. In 1932 the ice was observed between Grimsey and Melrakkasletta and off Langanes.

An east-north-east wind will hold the ice on to the Greenland coast, but with offshore winds and storms, lanes of open water often appear.

BARENTS SEA

The lower air temperature combined with lighter winds tend to the formation and consolidation of ice. As in January the west coast of Spitsbergen is still open, although the fiords may be frozen over.

Most of the Barents sea, north of long. 75° N. is now covered by ice, increasing in thickness from 16 in. to 24 in. If this ice is broken by gales the small floes refreeze together. On account of the cold south-westerly current the outer limit of ice extends towards Björnöya (Bear island) which may be enclosed by scattered floes but generally the island will be clear after a few days. This southern limit varies greatly according to the wind.

At the mouth of the White sea, ice now stretches from Cape Gorodetski to Cape Kanin and extends north-eastwards to enclose Kolguev island, Gusinaya Zemlya and Matochkin strait.

WHITE SEA

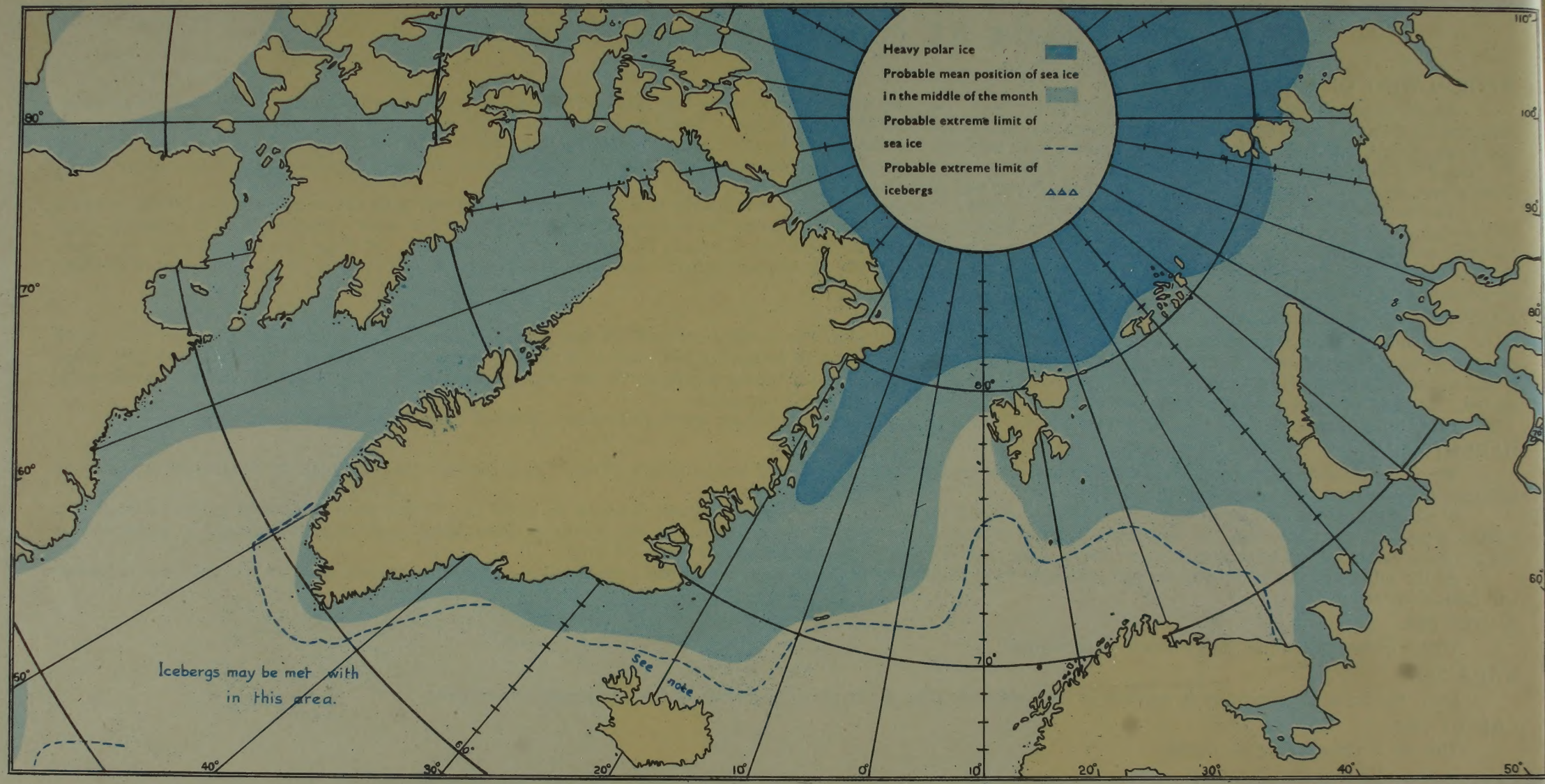
This is unnavigable in all but unusually mild winters.

KARA SEA

Ice in the Kara sea continues to increase in thickness over that of the previous month, and is completely unnavigable.

LAPTEV SEA

This sea is completely unnavigable.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See note
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40°
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AVERAGE ICE CONDITIONS DURING MARCH

REGION WEST OF GREENLAND

Hudson strait is completely blocked, and the combined packs from Hudson strait and Baffin bay pass down the coast of Labrador to the Great Bank of Newfoundland, off the north of which icebergs may be found.

Baffin bay pack covers its greatest area in March, and in Davis strait may join the winter fast-ice off the coast of west Greenland in the vicinity of Sukkertoppen. As in February, heavy storms may break the ice in Disko bay.

Pack-ice (storis) rounding Cape Farewell may reach past Frederikshaab. At Cape Farewell there is a greater spread, which may extend 100 miles to the south. In 1942 heavy pack was observed in lat. 59°N. long. 50°W. Icebergs outside the limit of the pack increase in number during this month, and scattered bergs may be met far to the southward of the limits of ice shown on this chart.

EAST COAST OF GREENLAND

The amount of ice off Angmagssalik varies. Westerly storms, i.e., offshore winds, drive the ice far out to sea, but when the wind subsides the ice again approaches the coast.

With prolonged westerly winds, ice may approach the north coast of Iceland, as happened in 1930, 1932, 1934, 1938 and 1940. In 1934 the ice was within 3 miles of Horn (North cape), and in 1932 it was seen off Langanes and all along the north coast. The ice in these years was not of such a character as to hinder navigation for a considerable period.

The extreme limit shown north of Iceland is that for 1941 and 1943, and elsewhere for 1942.

In the Greenland Sea the mean limit lies along the south coast of Jan Mayen.

BARENTS SEA

Young ice begins to form off the west coast of Spitsbergen. Pack-ice blocks the entrance to Wijde bay and Hinlopenstredet (Hinlopen strait).

Ice extends farther south in the sea to enclose Björnöya (Bear island) and extends farther south and west in the east and south-east as far as Svyatoi nos, at the entrance to the White sea. The extreme limit shown is that reached in 1942.

WHITE SEA.

This sea is unnavigable.

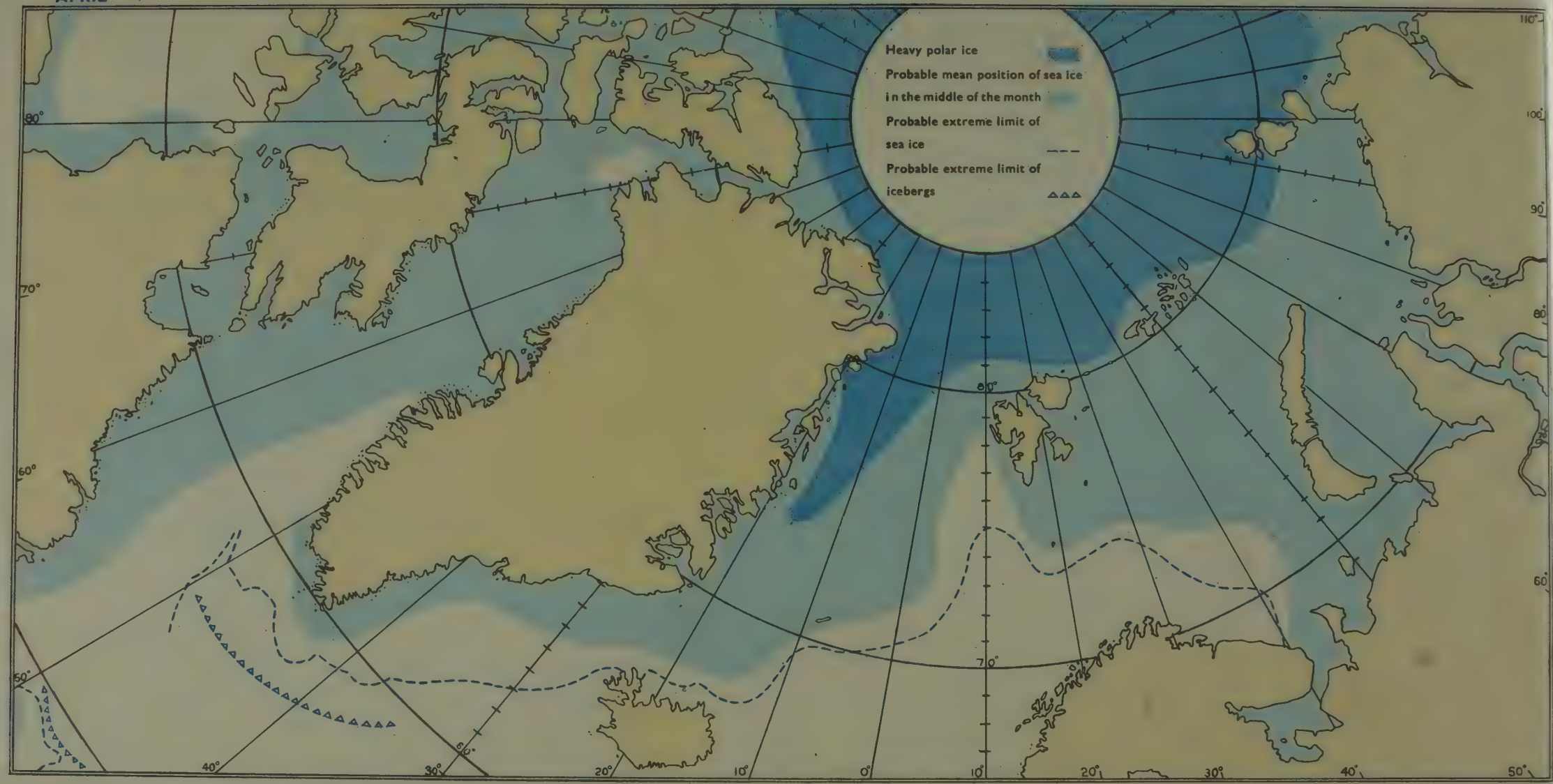
KARA SEA

This sea is completely unnavigable.

LAPTEV SEA

This sea is completely unnavigable.

APRIL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AVERAGE ICE CONDITIONS DURING APRIL

REGION WEST OF GREENLAND

Hudson strait and Davis strait are still blocked and the combined packs from Hudson strait and Baffin bay form a broad belt of close pack along the coast of Labrador. The easterly limit of the ice between Labrador and Cape Farewell probably reached east of long. 50°W. in 1936. Icebergs increase in number in the Strait of Belle Isle.

In several years the " North Water " has been observed, i.e., open water in the north of Baffin bay at the entrance to Smith sound. One explanation of this is that a warm current from the Atlantic ocean flows beneath the cold Davis strait water, and melts the ice as it emerges at the head of Baffin bay. Another theory is that a current in the opposite direction, i.e., to the southward, sweeps the ice away, but that the heavy ice north of Smith sound is firm enough to remain fast.

In Davis strait, the west-ice joins the winter fast-ice farther north than in March, off Egedesminde, Disko bay and Upernivik.

The main mass of the east Greenland pack (storis) consisting of large thick floes, rounds Cape Farewell in April. With a southerly wind the mean ice limit extends in a tongue to Frederikshaab. In 1924 the extreme limit extended to lat. 65°N. and some scattered ice was observed off Sukkertoppen. With a northerly wind, the edge of the pack may be 150 miles offshore, although the normal limit is about 60 miles. In April a large number of icebergs have been observed off Cape Farewell and may be found as far to the eastward as lat. 60°N., long. 32°W.

EAST COAST OF GREENLAND

The pack covers a greater extent than in any other month. The seaward edge may be broken up, and a lane of open water is often observed inside the ice off the mouth of Scoresby sound.

The extreme limit shown on the charts west of Iceland is that estimated by Danish authorities in 1934, when the ice was believed to have reached abnormally far south. In 1920 heavy pack-ice reached Horn (North cape). During this month and May, ice is most likely to approach the Icelandic coast if north-westerly winds are prevalent. The extreme limits vary considerably from year to year, and in good years may be much further north than here shown.

Icebergs were observed off Horn (North cape) and in Hunafloi bay in 1932.

In the Greenland sea east of long. 10°W. the extreme limit shown is that for 1942.

BARENTS SEA

This month is probably the worst. The limits of ice are a little further south and west than in March. An occasional berg may be met with in the Barents sea north of the Murman coast. During the latter part of the month, the sun begins to have an effect upon the ice, and old lines of weakness become accentuated by melting. Near Kolguev island leads begin to open under favourable conditions of wind and temperature.

WHITE SEA

Leads begin to open.

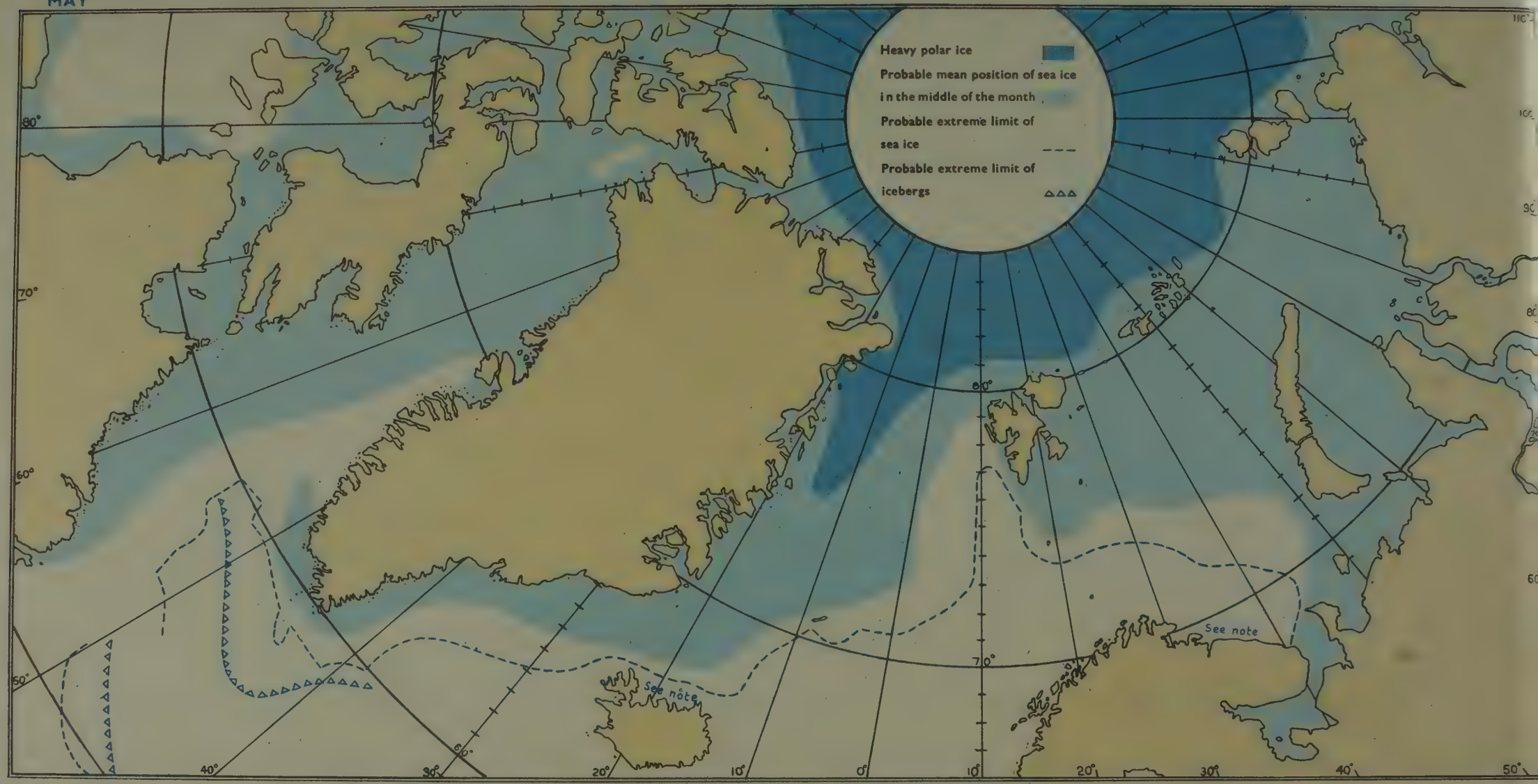
KARA SEA

This sea is completely unnavigable.

LAPTEV SEA

This sea is completely unnavigable.

MAY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AVERAGE ICE CONDITIONS DURING MAY

REGION WEST OF GREENLAND

Within Hudson strait a gradual decrease in the ice-cover commences, at first in the western end, during this month, but the strait remains impassable. Pack-ice off the coast of Labrador is less than in April, particularly off northern Newfoundland. Icebergs are most numerous over the Great bank of Newfoundland during this month. Pack-ice still blocks the Strait of Belle Isle, although the local coastal ice may disappear by the middle of May.

There is less pack-ice in Davis strait and Baffin bay. The " North Water," i.e., open water in north Baffin bay and Smith sound, was present in fifteen years during the period 1920-1938.

The ice disappears in this month from the fiords south of Disko bay, on the west coast of Greenland, although the west-ice may not be far offshore. The west-ice joins the winter fast-ice off Disko island, Vaigat and Upernivik. At the end of May ships may possibly reach Upernivik.

The mean northern limit of pack-ice (storis) rounding Cape Farewell extends in a tongue off the coast between Frederikshaab and Fiskernaes, and the extreme limit occurred in 1924, when scattered ice reached lat. 65°N. The normal width of the belt is 60 miles and it lies further off the coast than in April.

Occasional icebergs were met far to the south in 1942 and between longs. 35°W., and 37°W. in 1921.

EAST COAST OF GREENLAND

There is a wide belt of pack-ice, although the mean limit has retreated to the north-west of Jan Mayen.

The extreme limit extended to northern Iceland in 1938, but this is exceptional ; it included Jan Mayen in 1928, 1929, 1938 and 1942. The ice which appeared close to the coast of northern Iceland in 1938 for several days at a time was brought by northerly winds, but was so loose that it did not impede navigation.

BARENTS SEA

Ice in the fiords of western Spitsbergen usually starts to break up.

The ice in the southern part of the Barents sea begins to melt, breaks up and is navigable, as also is the ice in the western part of the Pechora sea. The mean limit is just north and east of that for April. Icebergs may be encountered in the vicinity of and to the eastward of Björnöya (Bear island) ; pack has been observed in several years. The extreme limit shown is that which occurred in 1942.

In May, 1929, a few bergs were observed just north of the Murman coast, but this is exceptional. They were driven to the south-westward by persistent north or north-easterly winds in the Murman region, and north-easterly and easterly winds off Bear island at the end of April, and afterwards set to the eastwards by the Murman current.

WHITE SEA

Navigation is generally possible by the middle of May, but usually requires the assistance of icebreakers, particularly through the Gorlo. The Dvina river is usually ice-free by about the third week.

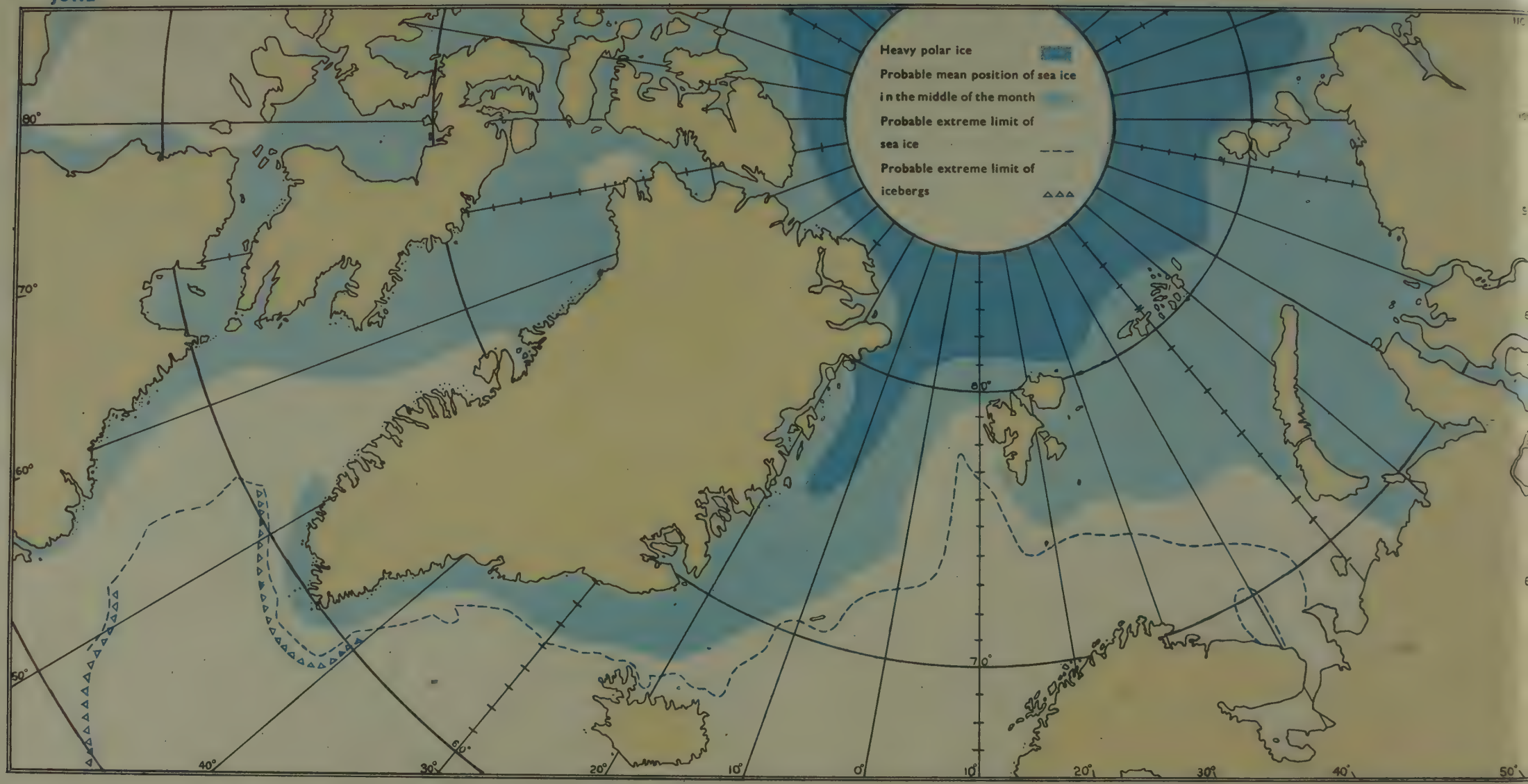
KARA SEA

In the southern Kara sea the ice reaches its greatest thickness, about 40 in. to 60 in., at the end of May. The whole sea remains quite unnavigable.

LAPTEV SEA

This sea is completely unnavigable.

JUNE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Probable extreme limit of icebergs
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AVERAGE ICE CONDITIONS DURING JUNE

REGION WEST OF GREENLAND

Hudson bay ice starts to break up. As in May, the ice-cover in Hudson strait continues to decrease, but the ice at the eastern end remains generally of an impenetrable nature. The pack off Labrador, much decreased in size, still reaches the Strait of Belle Isle, which in normal years however becomes sufficiently clear to permit navigation after the first week in June. The fiords on the coast of Labrador are now free of ice as far north as Hamilton inlet. Icebergs are numerous off the coast and off northern Newfoundland but decrease in number south of lat. 50°N. The edge of the Baffin bay pack off Cape Chidley is very scattered ; the extreme limit occurred in 1935 at about long. 54°W.

The fiords of the west coast of Greenland are clear as far as Umanak fiord. The middle pack (west-ice) lies about 70 to 80 miles from the coast until it meets the fast-ice farther north, but the sea between the fast-ice in Melville bay and the middle pack is at times navigable. The break up of the fast-ice in Smith sound may temporarily choke the " North Water," which covers a larger region than in May.

The pack-ice (storis) observed off Cape Farewell generally varies from 5 to 60 miles in width ; it sometimes reaches its greatest extent during this month, the edge being over 100 miles offshore. The pack usually extends to a point north of Frederikshaab, but the extreme limit reached almost to Godthaab in 1928, by the end of the month a decrease in the ice may be observed all along the coast. Most of the icebergs have drifted past Cape Farewell and into Davis Strait, but, as in previous months, scattered bergs may be found far to the southwards of the limits shown on this chart.

EAST COAST OF GREENLAND

The belt of pack is somewhat narrower than in May ; it becomes more open, and in very mild years strongly-built ships can get through without much difficulty. In the Greenland sea, the extreme ice limit occurred in 1942.

The sea off Angmagssalik is sometimes free of ice by the middle of the month.

The extreme limit shown off north Iceland is that for 1921 ; but exceptional positions of ice were observed in 1925 when a patch of ice appeared off Hunafloi bay, and in 1921 and 1936 when ice was seen off Horn (North cape). In 1924 and 1938 icebergs were observed.

BARENTS SEA

The west coast of Spitsbergen, north of Bellsund, is usually clear of ice. The north coast is sometimes clear, although it is still impossible to reach Nordaustland (North-east land). Pack is still found in Olgastredet (Olga strait) and Storfjord, enclosing Hopen and Kong Karls land.

The Barents sea is navigable south of lat. 75°N. by the middle of the month, though an occasional berg may be met within 50 miles west and south of Björnöya (Bear island), and between it and long. 40°E. The mean ice limit is north of that for May particularly in the eastern part. The extreme limit shown west of Bear island is that for 1929 and was obtained from Danish sources. The exceptional position of this ice was caused by strong north-easterly winds driving the ice to the south and west ; when the wind abated the ice melted rapidly. A patch of ice was observed in 1942 off the Murman coast, and a few days later progressively further to the north-eastward. This was a separate field and not the limit of the ice edge. It lasted only a few days and presumably consisted of ice carried out of the White sea by currents and winds. There is still much navigable ice in the Pechora sea and to the east of the Kanin peninsula. By the middle of the month it is usually possible to reach Yugorski and Kara straits with icebreaker assistance.

WHITE SEA

The sea is usually free of ice by early June, but after a severe winter, ice may prove troublesome at times, until the end of the third week of the month, depending upon the direction of the prevailing wind. In 1942, at the middle of the month, scattered floes of ice drifting out of the White sea were reported on the western side of the Gorlo and in the northern approaches to the sea.

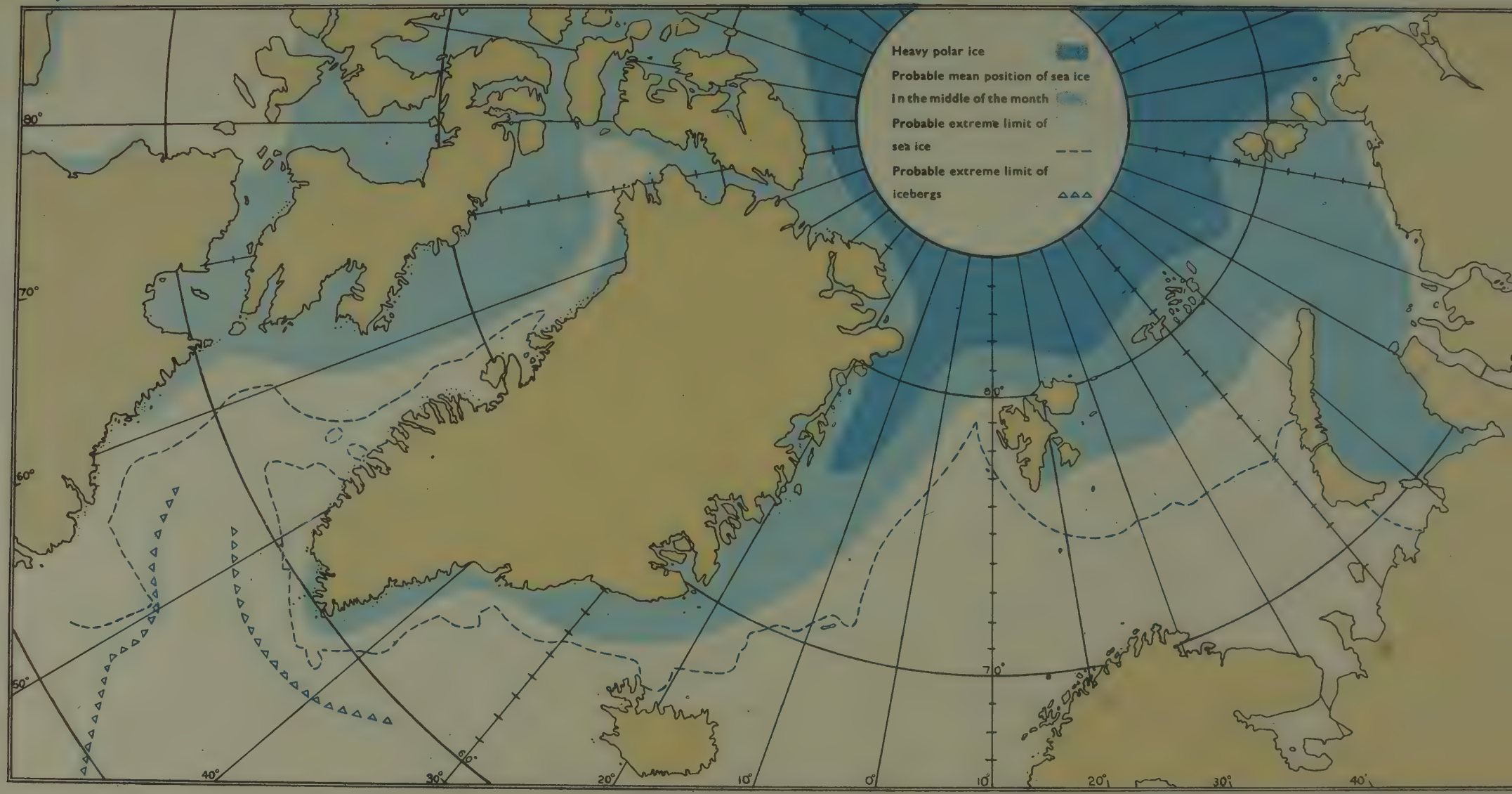
KARA SEA

The north Kara sea is still covered by pack-ice and Severnaya Zemlya remains unapproachable. The south Kara sea is just navigable towards the end of the month with icebreaker assistance, but as yet there are no large clearings in the ice.

LAPTEV SEA

The Laptev sea is still covered by pack-ice.

JULY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20°
30°
40°

AVERAGE ICE CONDITIONS DURING JULY

REGION WEST OF GREENLAND

The ice melts on the shores of Hudson bay, which are ice-free from about July 10th. The ice in Foxe channel and Hudson strait breaks up and becomes navigable with 90% open water. Hudson strait is open to shipping from about 19th July onwards. Baffin bay pack lies off the eastern entrance to Hudson strait until the middle or end of July, but there is little pack down the Labrador coast, although there is some ice in the inlets on the north coast of Labrador, which is, however, clear of ice about the last week in July. Although any ice coming down the Labrador coast may be heavy, it is of a broken nature. South of the Labrador coast, large loose areas of broken ice branch away from the main pack and may be found well to the southward of the limit shown on this chart, but they do not generally impede navigation. There are many icebergs off the Labrador coast and Belle isle, but few bergs are found south of lat. 50°N.

Conditions in Davis strait and Baffin bay vary greatly from year to year. It is possible to pass up the west coast of Greenland to Smith sound between the fast-ice in Melville bay and the middle pack, which usually lies 70 to 80 miles from the coast. It may even be possible to enter Lancaster sound.

Pack-ice (storis) rounding Cape Farewell decreases in July, and sometimes disappears at the end of the month. The mean limit reaches to about Nunarsuit and the extreme limit to Fiskernaes, although scattered ice was observed off Godthaab in 1920. Icebergs continue to pass into Davis strait during the month. In 1922 bergs were found further to the southward and westward than usual.

EAST COAST OF GREENLAND

During the early part of the month the seaward edge of the pack south of lat. 70°N. becomes scattered, and there is generally a lane of open water inshore south of lat. 68°N., particularly with north-west winds. As the month advances, the whole pack becomes loose and navigation is possible for well-built ships. Angmagssalik may be ice-free by the end of the month and Scoresby sound can generally be entered.

In 1921, 1929 and 1937 the ice approached Horn (North cape and in 1929 heavy pack-ice filled Hunafloi bay. In 1932 and 1933 bergs were seen off Horn (North cape).

BARENTS SEA

The north and west coasts of Spitsbergen are accessible. Pack-ice still lies off the north coast of Nordaustland (North-east land), around Edge island and Kong Karls land, unless blown away by strong winds.

The north Barents sea is navigable as far as lat. 78°N. for strongly-built ships, and for all ships in a mild season. The ice may be of such a light and open nature as to make Franz Josef land accessible. Icebergs may be met with up to 100 miles outside the pack-ice limits. The mean limit extends from South cape, Spitsbergen to Cape Jelaniya, Novaya Zemlya ; the extreme limit, which was obtained from Danish sources, approaches Björnöya (Bear island), but this is exceptional. It occurred in 1929 and was caused by strong north-easterly winds driving the ice to the south and west, either in July or at the end of the previous month. Occasional icebergs were also seen in 1927, 1929 and 1932 in the vicinity of Bear island and in 1923 and 1928 to the east of Hopen. In 1936, 1937 and 1938 the limit in the Barents sea was much further north, at lat. 80°N. In 1926, 1927, 1934 and 1935 the limit was well south of the mean.

In the south, during the first half of July, there is often an easier passage northward of Kolguev island than to the south of it. In the second half of July there is very little ice in the Kolguev region but it is found east of the estuary of the Pechora river.

WHITE SEA

The sea is free of ice in July.

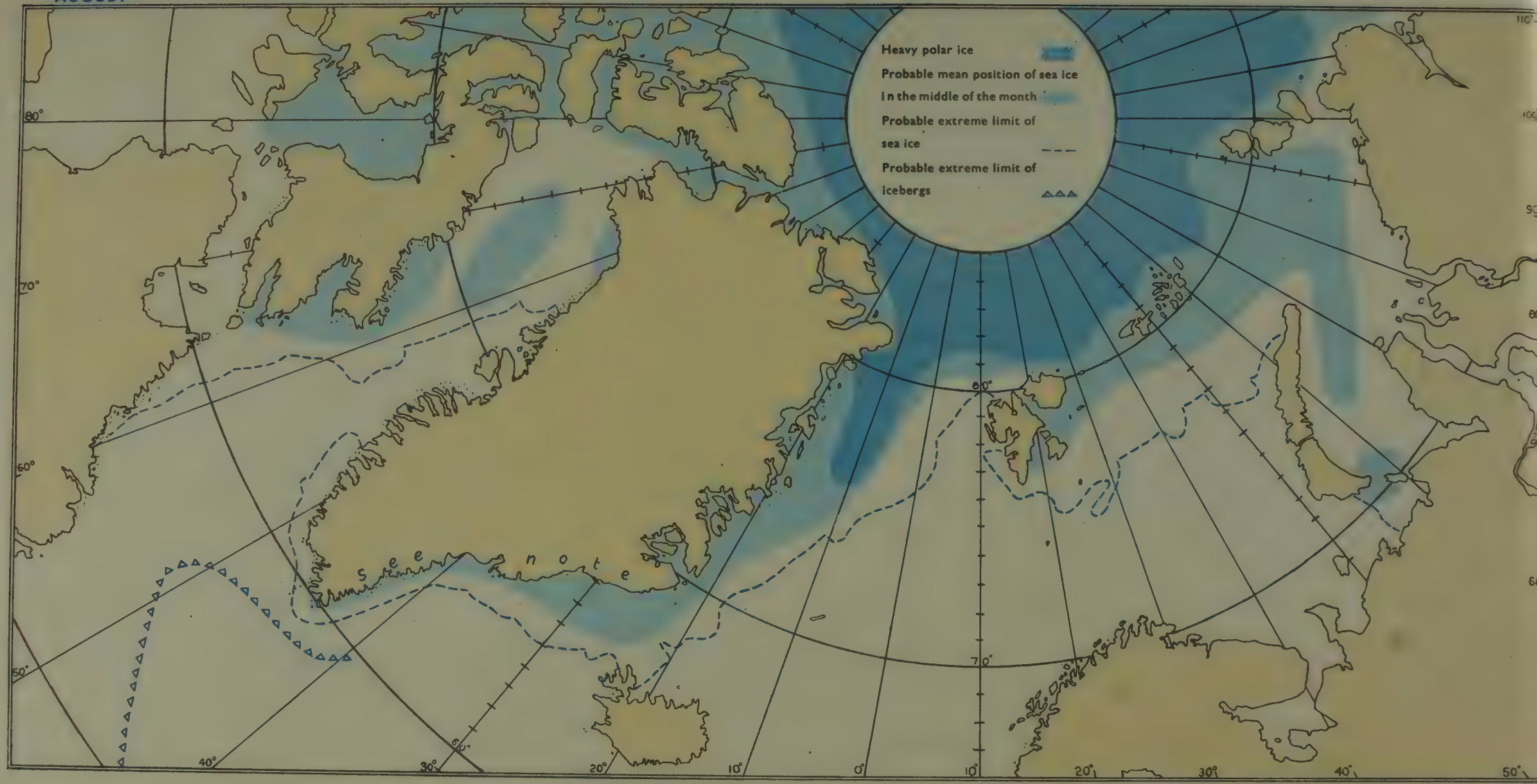
KARA SEA

The amount of ice varies greatly from year to year ; Matochkin strait is open, and the estuaries of the Ob' and Yenisei are free. Navigations should be possible without icebreakers in the south Kara sea. Local areas of pack may block Kara and Yugorski straits. During the period 1920-1938 the Khariton Laptev shore was free in thirteen years. Ice still persists in Borisa Vilkitskogo strait.

LAPTEV SEA

In the vicinity of the rivers the coastal region of the Laptev sea is generally free of ice.

AUGUST


Heavy polar ice
Probable mean position of sea ice in the middle of the month
Probable extreme limit of sea ice
Probable extreme limit of icebergs
see note
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AVERAGE ICE CONDITIONS DURING AUGUST

REGION WEST OF GREENLAND

Hudson bay, Hudson strait, the Labrador coast and Davis strait are now clear of ice, with the exception of numerous bergs drifting down the coast of Labrador and off northern Newfoundland. In this month the number of bergs decreases rapidly from the maximum in July.

Both the west and east side of Baffin bay are practically clear, but heavy ice has been observed in the central area. Any ice found on the east and south coast of Baffin land will probably be navigable.

Lancaster sound, Jones sound and the northern part of Smith sound still contain ice, but are nevertheless navigable. If the ice in Kane basin breaks at all it will do so in August and be carried by the outward-flowing currents across the " North Water." Fast-ice still lies along the east coast of Melville bay, but the bay itself is generally navigable.

Ice usually continues to round Cape Farewell at the beginning of the month, generally reaching Julianehaab bay. In 1940 the ice reached exceptionally far north, to Godthaab fiord, but this was the only occasion since 1920 that it had passed Fiskernaes. The pack disappears off Julianehaab early in the month, and off Cape Farewell by the end of the month or beginning of September. Icebergs off Cape Farewell spread as far as long. 40°W. and as far south as lat. 57°N.

EAST COAST OF GREENLAND

Off the east coast of Greenland, south of lat. 71°N., the ice drifting down to Cape Farewell generally consists of light open floes which do not impede navigation, and Angmagssalik may be entered. Open water may be found off Scoresby sound, Kaiser Franz Josef fiord and in Dove bay.

In 1929 the extreme limit of ice advanced to Horn (North cape), Iceland, but this was exceptional. The ice at the beginning of the month consisted of light scattered floes, but floes later drifted into and blocked the west side of Hunafloi bay and were of such a nature as to hinder navigation. By the end of the month the Iceland coast was again clear. Icebergs have been observed occasionally off Horn (North cape) and off the west coast.

BARENTS SEA

It is possible to reach the north coast of Nordaustland (North-east land) and all coasts of Spitsbergen ; ice usually remains only in Olgastredet (Olga strait) or Storfjord. Conditions in Hinlopenstredet (Hinlopen strait) vary from day to day ; it may be blocked when the seas to the north and south are open. It is usually possible to reach the south coasts of Franz Josef land.

August and September are the most favourable months for navigation. In a mild season the limit in the north Barents sea stretches from north of North-east land (at times as far north as lat. 82°N.) to about 60 miles north-east of Cape Jelaniya. An occasional berg may be met with north of lat. 75½°N. and also in the vicinity of Björnöya (Bear island).

In the south the Pechora sea is now free, and any ice which may drift from the Kara sea thaws rapidly because of the warmer water from the Pechora river.

WHITE SEA

The sea is free of ice.

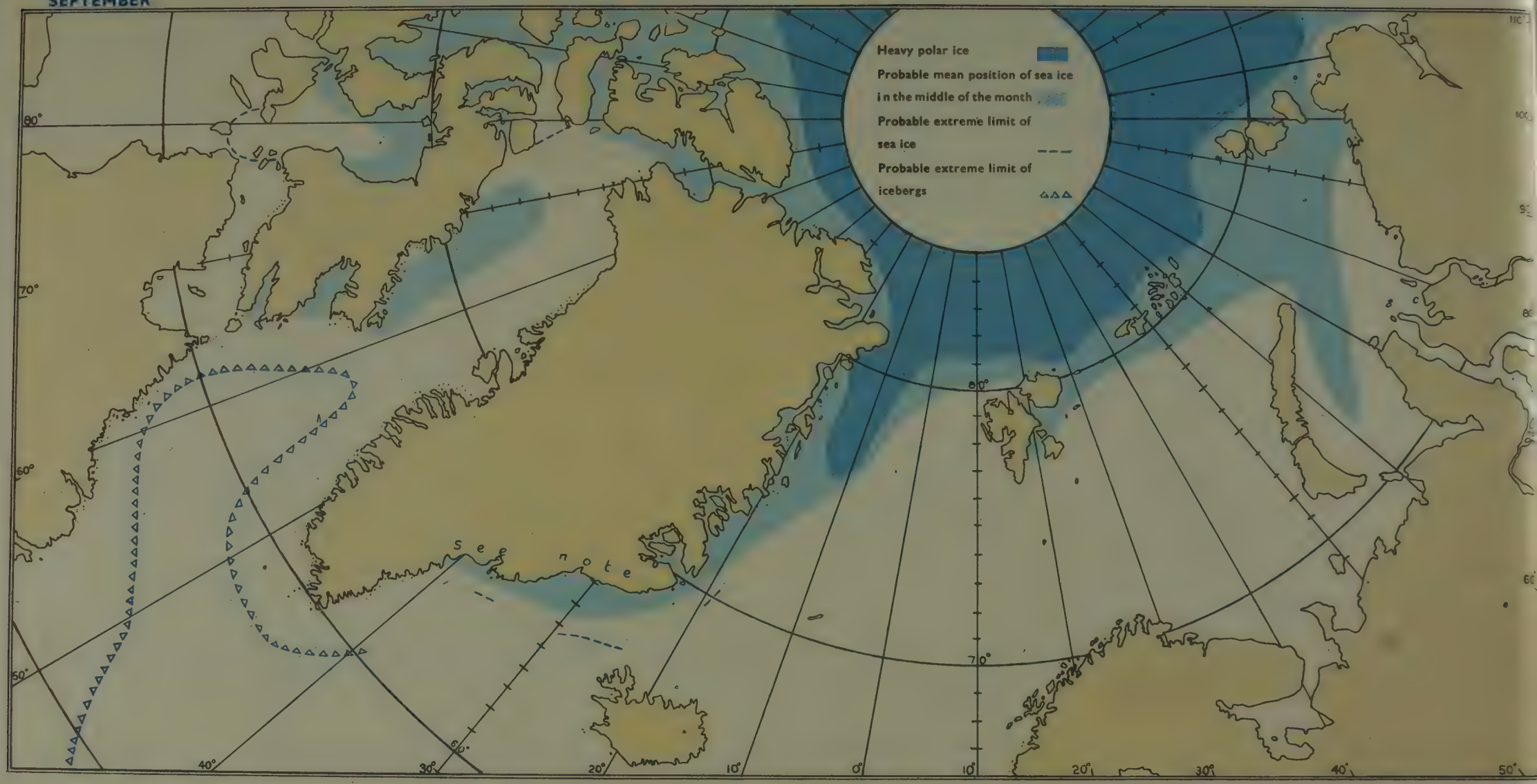
KARA SEA

Navigation is possible in the north-eastern Kara sea after the first week in August. The tongue of loose ice which stretches south in the western Kara sea varies greatly in size and position, but there is little ice around the Yamal peninsula. Navigable ice which has drifted out of the Kara sea is still often present in Kara and Yugorski straits. Borisa Vilkitskogo strait is clear, but there may be scattered navigable ice off the Khariton Laptev shore.

LAPTEV SEA

The Laptev sea is generally navigable during this month ; ice is only met with in its north-western part.

SEPTEMBER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See note

AVERAGE ICE CONDITIONS DURING SEPTEMBER

REGION WEST OF GREENLAND

Hudson bay, Hudson strait, Davis strait and the coast of Labrador are free of ice, other than the many icebergs off the west Greenland and Labrador coasts. Isolated bergs have been observed in exceptional positions as far east as between longs. 40° and 42°W. Foxe channel and Cumberland sound may have much open water. Fury and Hecla strait, the Gulf of Boothia, the east coast of Prince Regent inlet, Admiralty inlet and Eclipse sound are navigable through scattered ice. Lancaster sound and much of Smith sound are usually clear. There is a wide area of clear water between the middle pack of Baffin bay and the west coast of Greenland, and a passage still exists between the middle pack and the east coast of Baffin land.

Cape Farewell is usually free of ice, but occasional scattered floes, which probably arrived in the previous month, may be found off the coast to the south and west.

EAST COAST OF GREENLAND.

South of lat. 71°N. the ice drifts down to lat. 65°N. south of Angmagssalik, but as in August, this ice does not impede navigation ; the sea is often clear except for a few bergs, which are also very occasionally seen off the north coast of Iceland. Scoresby sound may be clear and Denmark strait is usually clear.

BARENTS SEA

Conditions are practically the same as in August. Strong north winds are liable to bring the ice down on to the coasts of Franz Josef land and Nordaustland (North-east land).

WHITE SEA

The sea is free of ice.

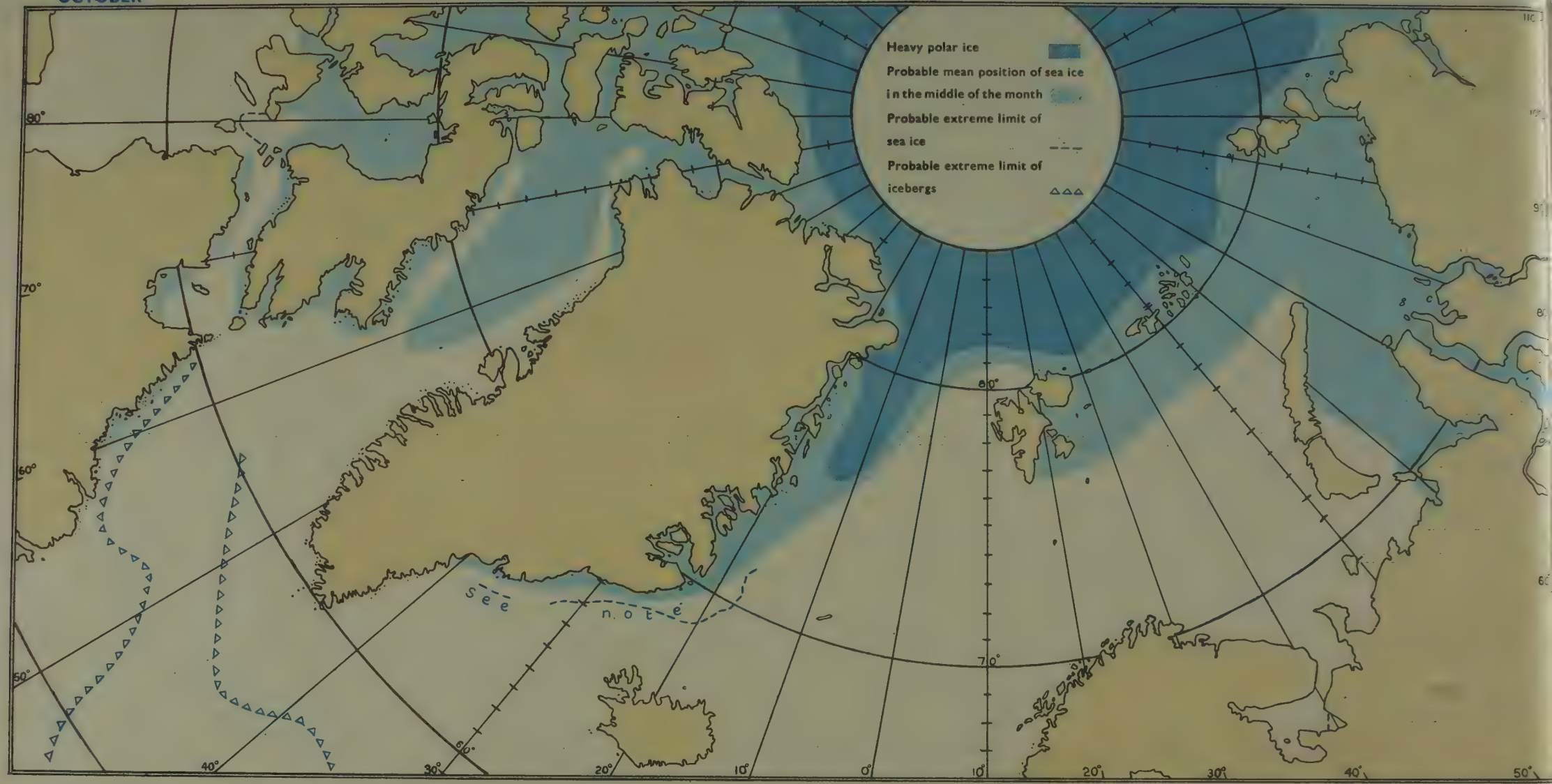
KARA SEA

There is a varying amount of navigable pack in the Kara sea, and ice starts to form again in the east.

LAPTEV SEA

As in the Kara sea, there is a varying amount of navigable pack ; ice starts to form again in the western Laptev sea.

OCTOBER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See note

AVERAGE ICE CONDITIONS DURING OCTOBER

REGION WEST OF GREENLAND

Young ice begins to form along the shores of Hudson strait, Ungava bay and in the harbours and inlets of Labrador from Nachvak bay to Hopedale harbour. The shores of Hudson bay do not begin to freeze until the end of the month, but ice forms in Foxe channel.

In Baffin bay the area of pack has increased since September by ice from Smith sound and the Parry archipelago, by way of Jones sound and Lancaster sound. The ice is packed along the coast of Baffin land as far as the mouth of Cumberland sound, in which new ice has formed. There is usually a lane of open water between the middle ice and any remaining fast-ice of eastern Melville bay.

As in September, Cape Farewell is free of ice except for occasional scattered floes which may be well to the southward and westward.

EAST COAST OF GREENLAND

As from July, this area is usually navigable to lat. 70°N., with as a rule only a few bergs south of lat. 68°N. Young ice makes Scoresby sound unnavigable ; the pack passes the mouth early in the month, and prevents access to Scoresby sound for the next 9 months. It may reach Angmagssalik by the middle or end of the month. Pack-ice was observed here in 12 years from 1920-38. The extreme limit shown off the east Greenland coast occurred in 1940, although scattered floes have been observed very occasionally beyond this limit. The ice rarely reaches south of lat. 65°N.

In 1925 bergs were observed off Horn (North cape) Iceland, and in Hunafloi bay, but this is exceptional.

BARENTS SEA

Young ice forms to the east of Spitsbergen, and around Franz Josef land. Cape Jelaniya is approachable, and in the south, Matochkin and Kara straits are still navigable. In the north Barents sea, and between Franz Josef land, Cape Jelaniya and Nordaustland (North-east land), frequent strong gales may break up the new ice producing much open water, but heavy pack-ice may be expected around Kvitöya (White island) and Victoria island. Ice was reported off the west coast of Spitsbergen in several years by the Danish authorities ; in 1921 it was observed from 50 to 70 miles offshore but this is a very unlikely occurrence.

WHITE SEA

At the end of October ice begins to form in the inlets of the White sea, although navigation is still unrestricted.

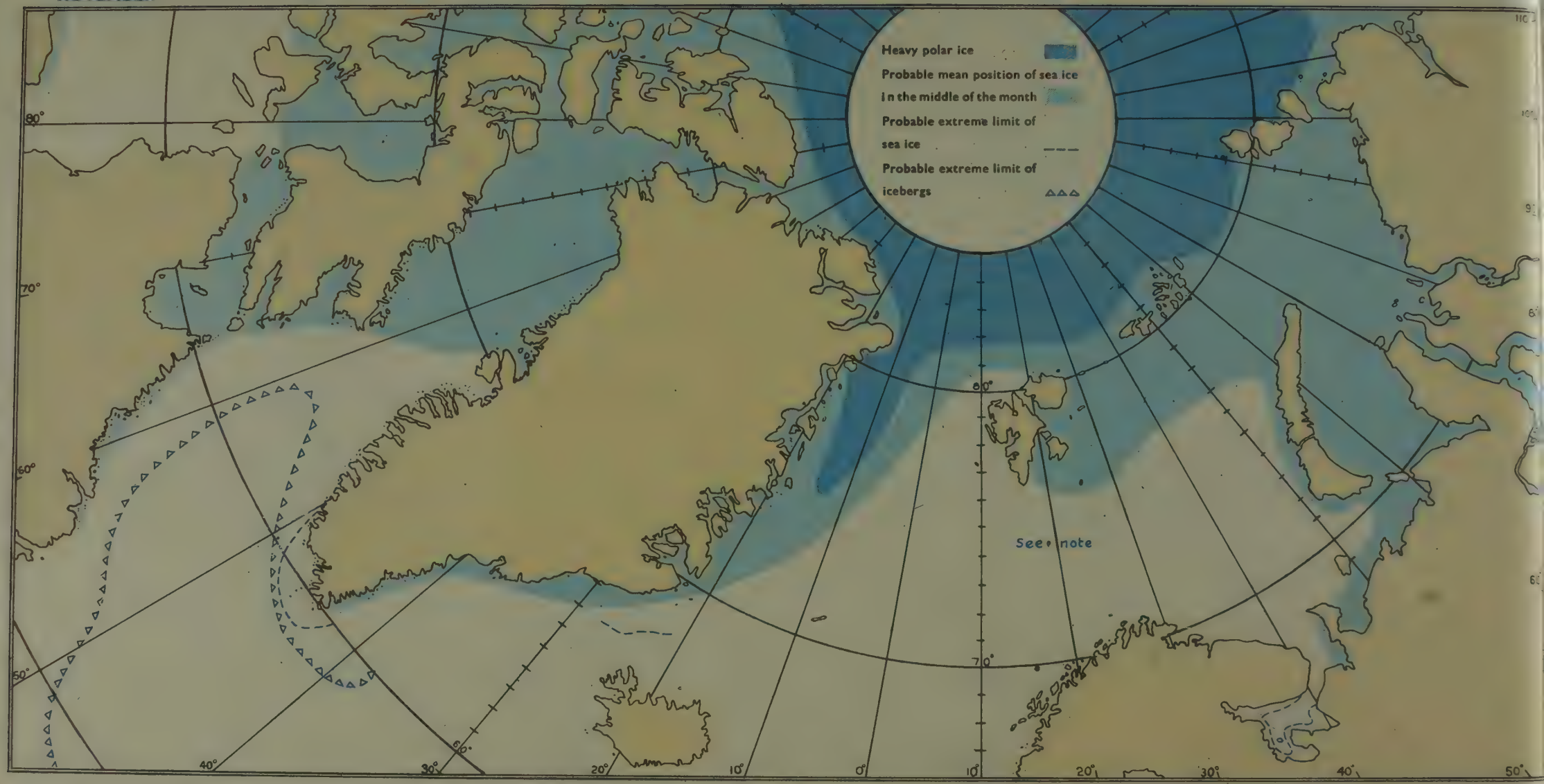
KARA SEA

Young ice forms in the Kara sea, and off the coast east of Vaigach island, blocking the estuaries. The north Kara sea and Borisa Vilkitskogo strait are unnavigable. In the east new ice cements together individual floes.

LAPTEV SEA

Ice continues to form in the Laptev sea, which is unnavigable except in coastal areas.

NOVEMBER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AVERAGE ICE CONDITIONS DURING NOVEMBER

REGION WEST OF GREENLAND

New ice increases along the shores of Hudson bay. By the middle of the month Hudson strait is generally unnavigable, as it is blocked by pack-ice, which mainly originates from the new ice which forms in the shallow basin of Foxe channel, and the ice which drifts through Fury and Hecla strait from the Gulf of Boothia. The Hudson bay pack arrives at the western end of Hudson strait at the beginning of the month, and at the eastern end at the middle or end of the month. At Cape Chidley it meets the first of the pack from Baffin bay which has passed Cumberland sound and Frobisher bay. The ice forming off the Labrador coast and in the harbours and inlets is navigable until the middle of the month. The Strait of Belle isle is still open but towards the end of the month it may occasionally be closed to navigation.

The " west-ice " in Baffin bay reaches the coast at Upernivik and new ice forms in Umanak fiord, although it has not yet formed in Disko bay.

It is possible that at the end of the month the pack (storis) may round Cape Farewell, as happened in 1923 when the ice reached past Arsuk.

EAST COAST OF GREENLAND

Pack-ice may extend in a narrow belt along the coast of Angmagssalik, but by the end of the month a wide belt of impenetrable ice may be established at this point.

Iceland is usually free except for bergs, but in 1934 ice was observed 50 to 60 miles north-east of Horn (North cape). The extreme limit shown was obtained from observations in 1939 and 1941.

BARENTS SEA

More ice forms to the east of Nordaustland (North-east land) and occasionally Olgastredet (Olga strait) and Storfjord are tightly packed. The north and west coasts of Spitsbergen are ice-free, although care is required inside the fiords on account of the danger of encountering small bergs in the darkness. In some years the fiords have frozen. In 1926 and 1927 the Danish authorities reported ice off the west coast of Spitsbergen, but these instances are exceptional.

In the Barents Sea the mean limit is farther south than in October, although to the south and west the new ice is still being broken up by gales. Occasionally as in 1926, 1927 and 1928 ice was seen in the neighbourhood of Björnöya (Bear island). Fast-ice is present in the channels of Franz Josef land and ice has now formed to the north and west of Novaya Zemlya. In the south, young ice forms from Cape Kanin to Kolguev island and then to Kara Strait.

WHITE SEA

Ice forms along the coasts of the White sea, but this ice is navigable. Icebreakers become necessary in the Dvina river.

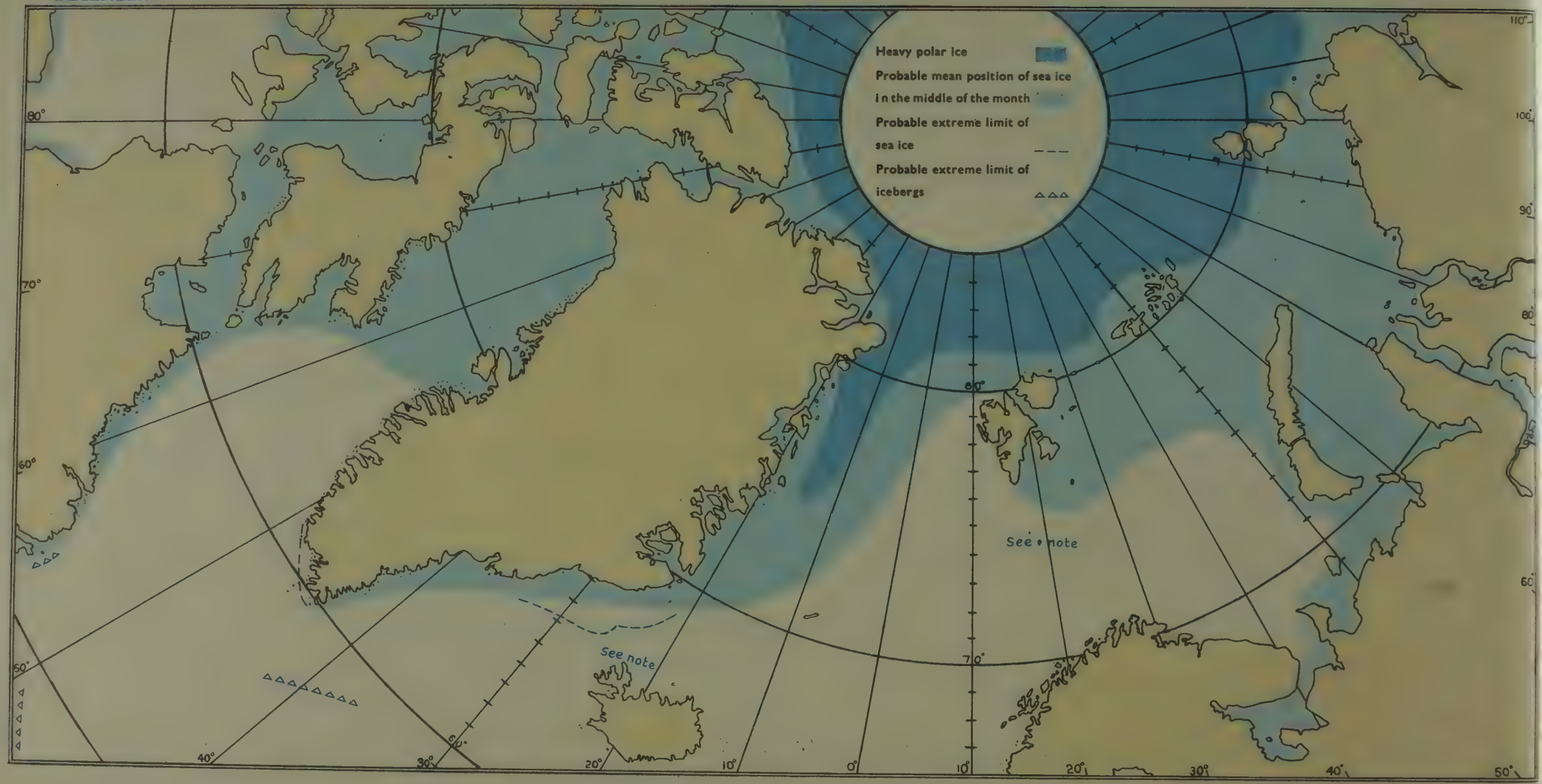
KARA SEA

The Kara sea is now mainly covered by unnavigable ice.

LAPTEV SEA

The coastal area of the Laptev sea is generally frozen over by the end of the month.

DECEMBER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AVERAGE ICE CONDITIONS DURING DECEMBER

REGION WEST OF GREENLAND

Fast-ice has now formed in the bays and along the shores of Hudson bay, and Hudson strait is unnavigable, although the ice is not necessarily tightly packed, but may consist of large floes. As in November, some of this pack-ice comes from Foxe channel and the Gulf of Boothia, but a certain amount consists of Baffin bay pack brought from Davis strait by the current which flows westward along the northern side of Hudson strait. The combined Baffin bay pack and Hudson strait pack, which joins off Cape Chidley, drifts down the coast of Labrador in December as far as Hamilton inlet, at first as isolated floes but later as a broad heavy stream. Navigation ceases in the inside channels of the Labrador coast, and the fast-ice reaches out beyond the islands. Young ice forms in the Strait of Belle Isle, which is generally unnavigable after the first week in December. Icebergs may occasionally appear in the Strait of Belle Isle.

Ice forms in the fiords of the west coast of Greenland as far south as Sukkertoppen, but the winter fast-ice in Disko bay is often broken by heavy storms. The " west-ice " meets the fast-ice off Disko bay and Egedesminde ; off Umanak the west-ice and fast-ice have frozen together.

Pack-ice (storis) rounding Cape Farewell may reach as far as Arsuk. Icebergs drifting down the east coast on approaching Cape Farewell are set off the land by the prevailing north-west winds.

EAST COAST OF GREENLAND

The belt of pack-ice extends to about 30 miles offshore. Pack-ice is now observed south of Angmagssalik.

In 1937 the ice in Denmark strait was beyond the mean limit, and on December 1st scattered ice was seen close to Horn (North cape), Iceland. The extreme limit shown was observed in 1941.

BARENTS SEA

Ice forms in the fiords of Spitsbergen, in Olgastredet (Olga strait) and in Hinlopenstredet (Hinlopen strait).

Ice has now formed continuously in the north Barents sea, but is still scattered to the north of Björnöya (Bear island), which it occasionally reaches. Franz Josef land is surrounded by ice. Darkness is a serious handicap in these latitudes. In the south the ice extends across the Pechora sea to Kolguev island and Kanin peninsula.

WHITE SEA

By the middle of the month the White sea is usually unnavigable without the assistance of icebreakers, and Archangel is closed.

KARA SEA

The Kara sea is unnavigable except by powerful icebreakers.

LAPTEV SEA

The Laptev sea is unnavigable except by powerful icebreakers.

AVERAGE ICE CONDITIONS IN NORTHERN ARCTIC PORTS

CANADA

Hudson strait ...	Navigable from the middle of July to the end of October, without the assistance of icebreakers.
Hamilton inlet ...	The extreme limits of the navigation season may be taken as from the middle of June until November.
The Strait of Belle Isle	Usually open to navigation from the end of the first week in June to the first week in December.

WEST GREENLAND

Jakobshavn ...	Disko bay blocked by locally formed ice from December to June. No floes after June, but huge bergs are present throughout the year.
Frederikshaab ...	Usually free from July to January.
Julianehaab ...	Usually free from July to December. Pack-ice may set into the harbour at any time of the year.

EAST GREENLAND

Angmagssalik ...	Navigation may be possible from late June to October.
Scoresby sound ...	Navigation is usually possible in August and September, and frequently also in July.

NORWAY

Narvik	Open to navigation throughout the year.
Tromso	,, ,, ,, ,, ,, ,,
Vardo	,, ,, ,, ,, ,, ,,
Vadso	,, ,, ,, ,, ,, ,,

FINLAND

Petsamonvuono ...	Navigation unimpeded by ice throughout winter, as far as Liinahamari.

U.S.S.R.

Murmansk ...	Open to navigation throughout the year. Assistance of icebreakers rarely necessary.
Yekaterininskaya ...	Rarely freezes to such an extent as seriously to impede navigation.
Dikson harbour ...	Usually free from the middle of July to the end of September.

White Sea Ports

Soroka	Closed to navigation generally between 4th December and 17th May.
Onega	Closed to navigation generally between 25th November and 6th May.
Archangel	Port officially opened and closed according to requirements. During recent years port has on average been open to navigation with icebreakers' assistance from the 15th May until the 15th December. The date of opening may be advanced or retarded 10 days or so; the latest date of closing was the 6th January. More powerful icebreakers may extend these dates a little.

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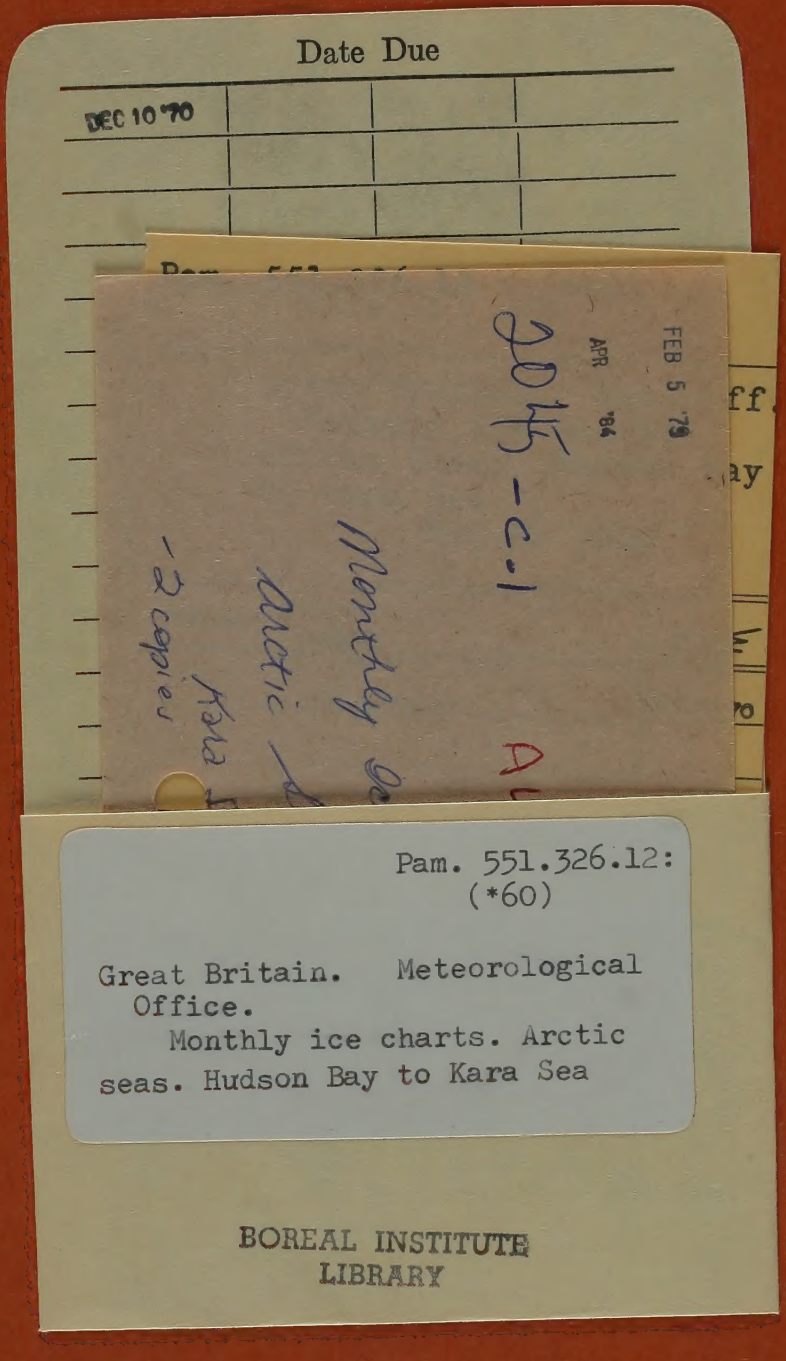

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Great Britain. Meteorological Office.
Monthly ice charts. Arctic seas. Hudson Bay to Kara Sea

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